

# F-gases

## GHG Inventory summary Factsheet

**Territorial coverage:** UK including Crown Dependencies and Overseas Territories

**Total emissions:** Quoted with respect to emissions including net LULUCF

**Sector Definition:** National Communication

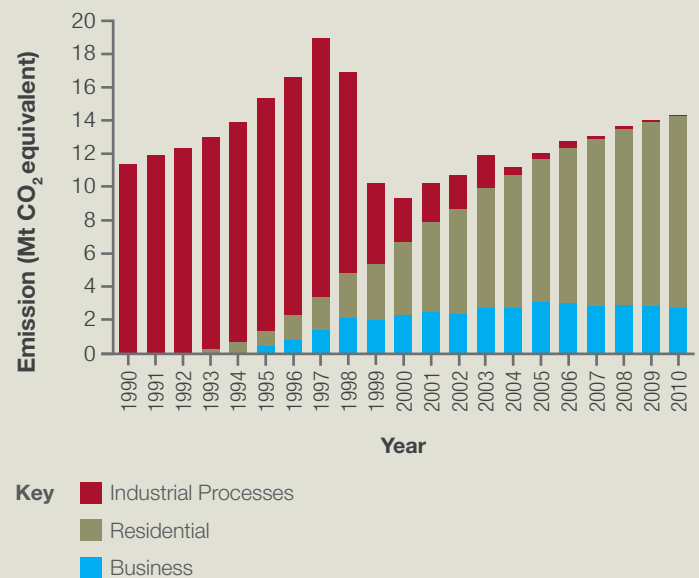
### GHG summary - historic emissions

- Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur Hexafluoride (SF<sub>6</sub>) together comprise the F-gases. Their Global Warming Potentials (GWPs), given relative to the same volume of carbon dioxide range from 140 to 23,900.
- Emissions of the F-gases have increased by 10.2% from 1990 to 2010 and are currently 15.2 MtCO<sub>2</sub>e (2.6% of UK total GHGs).
- PFC emissions have decreased by 84.3% from 1990 to 2010, and SF<sub>6</sub> emissions by 33.0%. However, HFC emissions have increased by 25.7% over this same period
- In 2010 F-gases accounted for 2.6% (15.2 MtCO<sub>2</sub>e) of the UK's greenhouse gas emissions, of which the majority, 94.0% (14.3 MtCO<sub>2</sub>e), are HFCs, with the remainder comprised of 0.7 MtCO<sub>2</sub>e SF<sub>6</sub> and 0.2 MtCO<sub>2</sub>e PFCs.
- Between 1998/99 there has been a fall in emissions from F-Gas manufacture (2E1, HFC by-product emissions from HCFC manufacture), due to the installation of abatement equipment at two of the three UK manufacturers. Emissions from certain end use sectors, such as refrigeration (2F1) are continuing to grow.

### Sources of emissions and data sets

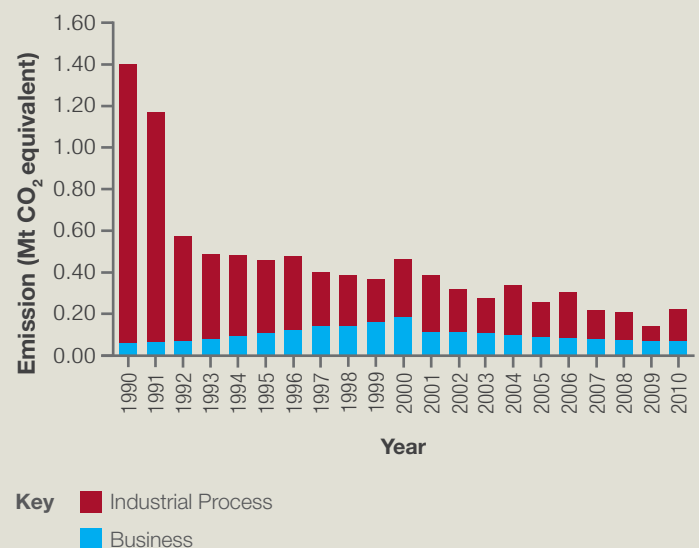
- The main source of HFCs is refrigeration and air conditioning. More than half of PFC emissions arise from aluminium production, and electrical equipment and sporting goods account for 81% of total SF<sub>6</sub> emissions.
- For refrigeration and air conditioning, key sources of data are refrigerant sales data from the British Refrigeration Association, literature sources, stakeholder consultation with industry experts, and the IPCC Guidelines.
- Key data sets for other sources include the Environment Agency's Pollution Inventory, data supplied directly by plant operators, literature sources and international guidance.

### UK HFC emissions by source (1990 - 2010)



Note: Categories used are based on source emissions not end-user.

### UK PFC emissions by source (1990 - 2010)



## Methodology

- Emissions of f-gases can occur:
  - As a by-product or fugitive emission from the production of fluorinated gases
  - As a by-product from certain industrial processes
  - Through the use of F-gases, either in products or for specific industrial applications
- Emissions of F-gases from fluorinated gas manufacture and aluminium production are based on data supplied either directly from the operators to the inventory compilers, or via the regulators' inventories (e.g. the Pollution Inventory).
- When F-gases are filled into products, emissions can occur during manufacture or filling of the product, through leakage during the product's lifetime, and at disposal. Examples of this type of source include refrigeration and air conditioning equipment, aerosols and metered dose inhalers, and electrical equipment.
- Emissions from these types of sources are modelled. This requires information about the amount of products in use, their typical lifetime, the amount of gas which leaks at manufacture or filling, annually during the lifetime of the product, and at the end of life.

## Uncertainties

- Uncertainties in UK F-gas emissions in 2010 are 6% for HFCs, 22% for PFCs and 15% for SF<sub>6</sub>.
- Uncertainty on the trend: The Monte Carlo analysis indicates that there is a 95% probability that emissions in 2010 differed from those in 1990 by 10% to +45% for HFCs, -87% to -81% for PFCs and -45% to -18% for SF<sub>6</sub>.

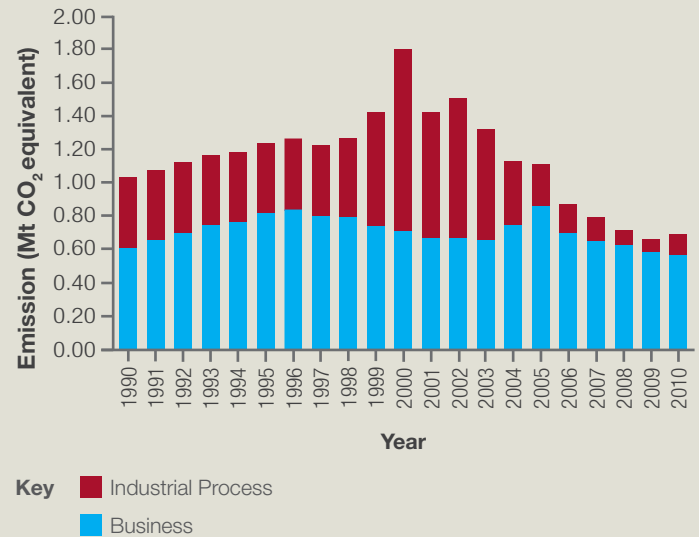
## Projections

- Projected emissions of F-gases are expected to decrease by 34% from 2010 levels by 2025.
- Emissions continue to be dominated by emissions of HFCs in the business and residential sectors.
- The overall decrease in F-gases emissions between 1990 and 2025 is estimated to be 48%.
- The projections presented here exclude the impact of emissions trading.
- The projections are taken from Updated Energy and Emissions Projections: October 2011 (DECC); historic data taken from the 2012 inventory.

## Links

- NAEI website: <http://naei.defra.gov.uk/>
- DECC GHG statistics: [http://www.decc.gov.uk/en/content/cms/statistics/climate\\_stats/gg\\_emissions/gg\\_emissions.aspx](http://www.decc.gov.uk/en/content/cms/statistics/climate_stats/gg_emissions/gg_emissions.aspx)
- DECC projections: [http://www.decc.gov.uk/en/content/cms/about/ec\\_social\\_res/analytic\\_projs/en\\_emis\\_projs/en\\_emis\\_projs.aspx](http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx)

## UK SF<sub>6</sub> emissions by source (1990 - 2010)



## Improvements

- In 2011 the refrigeration and air-conditioning model was rebuilt, to replace top down estimates of refrigerant use with bottom up data, based on literature sources and stakeholder engagement. All parameters in the model have been reviewed and updated

## Historic and Projected Emissions of F-Gases



Source: Updated Energy and Emissions Projections: October 2011 (DECC).